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ROLE OF THE DEVELOPING NATIONS IN THE DEVELOPMENT
AND OPTIMAL USE OF SPACE TECHNOLOGY

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16. Abstract The article explores the premise that mutual collaboration between developed and developing nations is the basic element which will allow developing nations to take part in space experiments and research.			
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ROLE OF THE DEVELOPING NATIONS IN THE DEVELOPMENT
AND OPTIMAL USE OF SPACE TECHNOLOGY

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During the first decade of the Space Era important practical applications of the investigation of space were developed and tested which are of immediate benefit to mankind. The discussions carried out up to now indicate that these practical applications might provide a material contribution to alleviate some of the economic and social problems which arise as a consequence of the explosive demographic growth, the serious shortage of food and the propagation of diseases, problems which in themselves are a source of considerable worry for most of mankind. /1*

At the same time it was emphasized that the elements and instruments which are involved in the investigations of extraterrestrial space through the complex, costly and specialized nature and known only to some nations.

The advances in space science and technology have been of benefit so far to most of the countries who are already at the head of the world economic system. The Space Era is increasing at an alarming rate the abyss already existing between the developed and the developing countries.

It is proper to acknowledge the critical role of the financial resources in the application of science and technology to the development and strengthening of internal capability. Because of the shortage of financial resources of developing countries, the application of resources to science and technology is usually far below the allocations in developed countries. A margin of flexibility of many developing countries is to severely restricted by the shortage of resources to

*Numbers in the margin indicate pagination in the foreign text.

give priority to space research.

The developed countries have accomplished nearly 95 percent of /2 all the activities of research and development whereas the developing countries representing 70 percent of the world population only represent 5 percent. These figures show the magnitude of the problem and the task to be faced.

The resources and technological potential required to eliminate the underdevelopment of the developing countries and to increase the worth of all mankind exists. The achievement of this objective requires on one hand for the developing countries to exercise total control of their own resources and on the other hand the equitable distribution and creation of scientific and technological capabilities in the world.

The developing countries have recognized a long time ago the need for following policies aimed at establishing on a national level the necessary structures allowing them to increase to the maximum their capability for development, absorption and use of science and technology, and to distribute the results of these important tools of development to all the areas of their population.

The international and regional cooperation for the development in the area of science and technology should help the developing countries to strengthen their capacity for creation and innovation and stimulate at the same time their autonomous scientific and technological development. It requires the introduction of changes in the present modalities of international relations in this sector so as to increase substantially international cooperation and thus enhance the scientific and technological capacities in accordance with the needs of each country and in accordance with its real situation and its prospects for the future as well as changes in the international process of transfer of technology so that these transfers should increase and be made much easier. In particular for the developing countries especially in the case of a technology as advanced as in the space sector.

We will now attempt to define the problem as to how the developing /3

countries can take part and achieve optimum use of the benefits of space technology referring in particular to the area of remote observation, the particular topic of this meeting. In this connection we consider what are the characteristics of the space technology being analysed for the purpose of knowing what are the capacities which the developing countries must acquire to be able to make use of it.

In this area we will say that remote observation has a capacity of overall monitoring which in order that it should provide a maximum benefit for solving the problems of use and management of natural resources while the data acquired should be accessible for use by all the countries.

That is why it is proper that those that produce these technologies should consider the needs of the developing countries, adopting the measures which assure that the space systems established by them should satisfy the needs of these countries.

A problem which affects in general the developing countries is not so much the access to the data obtained by the satellites for the natural resources, but the limited capacity which they have to use the latter so that it would be proper to have a political and social aim of establishing programs for when to use these data.

That is why there must be a clear understanding of what must be achieved with this data and the availability of adequate equipment and personnel.

Remote observation using satellites started in developed countries whose natural resources are generally well known and developed, and their management is carried out on the basis of data and very good information with continuously improved technology, methodology, education and training, so that these areas which are the best known have in their 4 turn the best equipped and trained investigators.

The contrary usually occurs in the developing countries in which the natural resources are known partly and lacking in data and reliable and updated information. While the infrastructure and personnel trained

to resolve the situation are generally inadequate.

It is undoubtedly true that remote observation is of high potential value to remedy the situation but for this to be achieved it is necessary to overcome limitations such as the absence of capable scientists, the lack of equipment and technical support, the resistance of existing structures to changing of the present methods and to work in a coordinated manner, the adequate knowledge of the possibilities of remote observation, the weakness of the decision making structure, etc.

One should therefore wonder whether the developing countries are faced with an irreversible situation and the answer is no, provided that the greater effort be made for the training of the human resources than the acquisition of equipment.

The situation is such because it is through this trained professional who will be able to put forward programs whose benefits to the country justify the investment in equipment, defining exactly what equipment are needed and avoiding purchases without effective application and using and maintaining it adequately, showing the advantages of the new technology and achieving the combination of efforts to accomplish important work.

When we speak of training human resources we do not refer exclusively to scientists or technicians but also to the persons in charge who have to take the decision. We must keep in mind that the generalized acceptance of a new technology requires years for all the action aimed at familiarizing, educating and training should be manifested in a reduction of time.

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It may seem that we are already late in the achievement of this training action, in view of the rate of evolution of this technology, but we must not forget that the systems now in use are of experimental nature so that we have the time to tackle successfully the operational phase, rendering our structures adequate to make full use of the possibilities.

Although this need for having qualified men and women has been well understood by developing countries, very often the actions accomplished have tended to face partial problems and not to achieve an overall solution starting sometimes non-coordinated educational programs and aimed only at professional personnel of higher level while others offer a multitude of courses which cause disorientation to anyone who has to offer one of them.

Another aspect to be considered is the number of professional people who must be trained so that it must be kept in mind that very often projects are attempted in which there are minute evaluations of physical investments, disregarding or not studying with equal interest the number of persons who will have to participate in them which leads to failure.

It is undoubtably true that the training of a large number of persons, sometimes in other more technologically advanced countries is costly, but very often we do not use the multiplication effect in the fact that this specialized person can spread his knowledge by not placing within his reach teaching material or demonstration equipment or not providing the time within a project for this activity to be accomplished.

We will now summarize this by saying that the training of human resources with the capacity to operate properly the elements which are involved in space technology is the main basis for the participation in the benefits drawn for mankind, that this training should be accomplished at all levels starting from the one at which the political decisions are made and ranging from scientists and professionals to the users; the /6 training method should be harmonious and continuous taking into account both the quality and the number of persons to be trained and finally keeping in mind the effort which is accomplished in this area will reduce the period for the space technology to be incorporated in the development of our countries.

The international organizations and their specialized agencies as well as those who have and develop these technologies must play an important role in this area since it must be kept in mind that the dev-

elopment of countries is that of mankind.

Although we have laid emphasis on remote observation we cannot fail to refer to telecommunications satellite systems, since the situation in this case is different inasmuch as it is possibly the most developed space technology and that most widely used by countries.

This technology is now fully in its operational phase and we consider that it was originated in the form in which it was born, seeing that it was initially designed for use on a world scale and the need that it must satisfy is concrete. The contribution produced by human development is immense both at the social and economic level; the contribution with regard to human interest, health, prevention of disasters, education are indisputable.

It cannot be doubted that the widespread use of this technology in the world has created problems in the frequencies and use of orbit, so that the efforts which are put forward for coordination and cooperation, are important so that the benefits derived from satellite telecommunication systems for mankind be accessible to all countries.

Once again we refer to the title of this paper referring to the optimal use by the developing countries of space technology to discuss two aspects apart from that of the training of human resources and which are concurrent.

The first is the one referring to technology transfer, a subject /7 which is discussed very often in our countries since attention is focussed on what may be received from the high technology centers without giving equal attention to the implementation of adequate mechanisms so that internally within the country itself there should be a process of circulation thus creating groups with high knowledge, closed in themselves and dedicated to investigations without any beneficiaries.

It is extremely important to consider this aspect of having the maximum possible participation of the potential users in all the areas of investigation and application which they will finally use.

The intervention of users creates understanding and desire to use what they have contributed to create thus facilitating the incorporation of a new technology.

The second aspect refers to what we could call "technological stimulation" or "technological magnetism". Day by day technology puts on the market new equipments and systems, anyone training in countries of high technology is acquainted with new instruments. It causes a permanent need for acquiring elements and is transformed into a career to maintain "a style" impossible to sustain. To prevent this one should plan adequately the investment of the resources (normally scarce) in programs with well defined objectives and achieve an exhaustive use of the abilities of these "old" systems which are two or three years behind.

We must keep in mind what was mentioned previously with regard to the present experimental nature of the technology of remote observation by satellite. If we consider the next 10 years we see a complex of new satellites, each of them with advantages and limitations as compared with the others, which indicates to us that a certain time will /8 elapse before the system is stabilized, a period which the developing countries should use to obtain the ability to apply the maximum possibilities of space technology.

Now we refer to the role which the developing countries should assume in the evolution of space technology, since we have to accept practically so far that we have been passive observers or at most consumers of this technology but never or hardly ever active participants in its development.

To remedy this situation it is proper to have a clear idea of what we want, what are our mistakes, so that we can take part in the definition and specification of projects in order that the latter should satisfy our needs and not what we consider necessary to use a technology.

As we mentioned previously this requires trained professional people who can formulate concrete technical definitions so that they can become

valid representatives to speak to those who now possess the technology.

It is undoubtedly true that space technology is very costly and it is practically impossible to claim to progress individually in this field. That is why mutual collaboration arises as the basic element which will allow our countries to take part jointly with the developed countries in space experiments and research.

We see daily this collaboration between developed countries inasmuch as even they cannot afford the immense investments which must be allotted. That is why we do not accept the position of those who consider that the countries possessing the technology represent a closed club to which we cannot have access since it is undoubtedly true that the developing countries must create the proper structures to take part in space technology programs.

This participation may assume different forms among which we can mention those which were described in the previous document 101/BP/8 /9 of the United Nations:

- a) "Participation in basic space research through analysis and interpretation of data of scientific research satellites"
- b) "Participation in the design and manufacture of satellites and ground receiving stations"
- c) "Research and development of new applications of telecommunication satellites or data of meteorological or remote observation satellites".

We consider that these are only some of the many paths which the developing countries can and should take to participate in the advances and applications of space technology is an active form and with the dynamism which the latter requires; it is a challenge which we must accept with the conviction of victory.